Testing the Neutral Theory of Plant Communities in Subalpine Meadow

Xiaoguang Du
Lanzhou University, China

Shurong Zhou
Lanzhou University, China

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Du Xiao-guang , Zhou Shu-rong
Laboratory of Arid and Grassland Ecology under the Ministry of Education , School of Life Sciences , Lanzhou University , Lanzhou 730000 , P . R . China .E-mail : duxg05@ yahoo .com .cn

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Introduction We tested the neutral theory of biodiversity within the Subalpine meadows on the eastern Tibetan Plateau in areas exhibiting comparatively complicated species composition , Our objective was to explain the species abundance distribution pattern and underlying mechanisms of biodiversity .

Materials and methods We fit the neutral model to random sampled data set obtained in three different types of habitats (north-facing slope , plain field and south-facing slope) . Three methods used to test the fitness of the neutral model to the real community were the confidence interval method , the goodness of fit method , and the diversity index method .

Results The results showed that there was no difference ($P>0.05$) between the neutral theory predictions and observed data of species abundance distributions in the three habitats according to the goodness of fit method . The observed data nearly completely falls into 95% confidence intervals of the neutral model predictions (only one out of 63 species in plain field communities and 2 out of 75 species in the north-facing slope communities deviate from 95% confidence interval) . There was no significant difference between the neutral theory predictions and observed species abundance patterns , in which the fit of richness predictions was the best ($0.49<P<0.56$) and the fitness of evenness predictions were poor . However , for the three different habitats , the fitness of these three indices in north-facing slope communities was perfect , and the p-value varied between 0 .49—0 .70 . However , the fitness in plain field communities were also relative poor (p-value of the Simpson diversity index is smaller than 0 .1) .

Discussion Although the test results of the neutral theory by three different test methods and habitats were somewhat different , the final conclusions were consistent . We concluded that the neutral model can commendably predict species abundance distribution pattern within these three different habitats of Subalpine meadow of the Tibetan Plateau .